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ABSTRACT

An investigation of children's tendencies to infer planfulness from the behavior of other actors revealed systematic differences in the responses of kindergarten and second-grade children to questions about the motives, goals, and knowledge of story characters. Participating in the study were 13 boys and 13 girls attending public school (15 kindergarteners and 11 second graders). Twelve simple story sequences illustrated by four colored pictures were used in four versions, each of which varied an actor's knowledge about a critical event that either had occurred or would occur depending on when the actor entered the scene. Each of the four versions consisted of one of the following sequences: plan, surprise, bad luck, or anomalous. One or 2 weeks after hearing 8 of the 12 stories and performing a memory task, subjects were told the remaining 4 stories, including 1 in each of the 4 story conditions. A semi-structured interviewing technique was used to probe children's understanding of the actor's goals, motives, knowledge, and beliefs. After the interview, the children were asked to retell the stories they had been told. Audiotapes of the interviews were transcribed and independently coded. Four contrast scores were formed for each dependent variable; these were analyzed by one-way analysis of variance, with grade as the independent variable. Results are discussed. (Author/RH)

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Children's Recognition of Plans in the Behavior of Other Actors

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Abstract

An investigation of children's tendency to infer planfulness from the behavior of other actors revealed systematic differences in the responses of kindergarten and second grade children to questions about the motives, goals and knowledge of story characters. Kindergarteners frequently failed to coordinate their responses to these questions, and thus gave answers that were internally inconsistent from an adult perspective. In addition, there was a tendency for these younger children to fail to use the evidence in the story to make appropriate inferences about actor's knowledge and expectations. Second graders rarely gave internally inconsistent responses. However, when the evidence in the story did not support their plan interpretations, second graders frequently ignored or denied the evidence. These findings are discussed in terms of a three phase model of plan interpretation presented in Sedlak (1979).

Children's Recognition of Plans in the Behavior of Other Actors

Over a decade of research on the moral judgment of children inspired by the writings of Heider (1958) and Piaget (1932/1965) has raised a number of questions about young children's ability to make inferences about the plans of other actors. Sedlak (1979) explored children's judgments about the plans, expectations, effort and desires of actors in stories that were systematically varied according to Heider's levels of responsibility. The findings of that study were interpreted in terms of a framework presented by Schmidt (1976) for describing adult-like explanations for human actions. Sedlak described a three phase process of hypothesis generation and testing involved in the identification of plans in others' behavior. First, the observer identifies some outcome that could plausibly be the goal. The selection of a plausible goal is governed by a "motive schema" which includes general rules about what motivates actors as well as specific beliefs about the actor being observed. The simplest of these motive-schema rules is simple hedonism - the proposition that actors will seek to produce good outcome and to avoid bad outcomes for themselves.

The second phase of plan interpretation requires that the observer coordinate a complex assortment of assertions about the actor's knowledge, beliefs, expectations, etc. For example, when an adult observer claims that an actor did A as part of a plan to produce O, the observer will also be willing to assert that the actor wanted to produce O, and that he or she believed that doing A would bring about O.

Finally, the inference of planfulness requires the observer to check all of the assertions that logically follow from the plan hypothesis that has been generated against external evidence. Thus, in the above example, if it is clear that the actor did not know that doing A would produce O, then the plan hypothesis must be rejected.

Sedlak (1979) found that children were willing to infer intent of the actor in stories in which adults recognized that the actor could not have foreseen the outcome. More interesting, she found that eight and eleven-year-olds did not feel compelled to coordinate their answers to questions about the actor's goal, expectations and intent. Sedlak interpreted these findings as evidence that children differ from adults at the second phase of the plan interpretation process. That is, their plan schema is incomplete, so that they do not feel compelled to coordinate as many assertions, and their answers to questions about the various explanatory constructs appear internally inconsistent to adults. If constructs such as actor expectation are not a part of their plan schema, then at phase three, children will not instigate a search of the evidence relevant to those constructs, which will make their answers appear externally inconsistent to adults.

This study sought to explore the development of plan interpretations in light of the above framework. Specifically, we designed a situation where we could see whether the children coordinated inferences about actor knowledge with inferences about motive based on simple hedonism. In addition, we could see whether the children checked their knowledge inference against external evidence. We predicted that younger children (kindergarteners) would not

have actor knowledge as a component of their plan schema and thus would give internally inconsistent responses. Specifically, we expected them to be willing to claim that an actor intended to produce an outcome while at the same time acknowledging that the actor couldn't have foreseen that his or her act would produce that outcome. Second graders were expected to be less likely to give internally inconsistent responses. We expected both kindergarten and second graders to be able to answer questions about actor knowledge that would be consistent with the external evidence.

In order to test these hypotheses, we constructed story sequences that could be altered to produce four types of stories. A PLAN story was constructed so that an actor observed a critical event which enabled a simple act to produce a positive outcome. In a SURPRISE story, the actor received the same positive outcome as a result of the same act, but was not present to observe the critical event, and thus could not have foreseen that the act would bring about the outcome. In a BAD LUCK story, the actor was unable to observe a critical event which set the stage for a bad outcome to result from the same act. Finally, an ANOMALOUS sequence presented an actor who did observe the critical event, but nevertheless performed the act which produced a negative outcome for the self.

If children do not consider actor knowledge to be relevant to the interpretation of PLANS, then the PLAN and SURPRISE stories should be understood in the same way, as should the ANOMALOUS and BAD LUCK stories. Assuming that they understand and follow the simple hedonism rule, these children should

deny that the outcome was the goal of the plan in both negative outcome stories, and affirm that the outcome was the goal in both positive outcome stories.

The concept of egocentrism has taken a major role in explaining children's responses to a variety of hypothetical situations presented in moral judgment research. If children show evidence of egocentrism in this task, it will mean that they are unable to make an adequate evaluation of the external evidence. Regardless of the presence or absence of the actor at the scene of the critical event, egocentric children will assume that the actor knows everything that they themselves know. Following Sedlak (1979), we predicted that children would not err at this third phase of the interpretation process, but that they would adequately assess the actor's knowledge, regardless of whether they used the information in their plan inferences.

Method

Subjects

Twenty-six children who were attending a public school in a rural North Carolina community participated in the study. Fifteen of the children were kindergarteners and eleven were second graders. Half were boys and half girls.

Materials

Twelve simple story sequences were prepared and each was illustrated by four colored pictures on 14 cm squares covered in plastic. Four versions of each story were created by altering the outcome to be good or bad for the actor, and by altering the timing of the actor's entrance on the scene, which varied the actor's potential knowledge about the situation. In each story

a critical event occurred either before or after the actor came on the scene. Because of this event, the actor's subsequent behavior brought about either a good or a bad outcome for the actor. Table 1 presents the four types of stories that result from these variations and an example story. When the actor sees the crucial event and the proceeds to produce a positive outcome, the sequence is labeled a PLAN story. If the actor could not have known about the crucial event, but still produced the good outcome, the story is a SURPRISE sequence. If the actor could not have known, and produced a bad outcome, the story is a BAD LUCK tale. In the case where the actor was present for the crucial event, but nevertheless produced the bad outcome, we call the story ANOMALOUS. Ordinarily, actors do not knowingly bring about bad outcomes for themselves.

Insert Table 1 about here

Procedure

Children were interviewed one at a time in a section of the school library provided for this purpose. In a first session they did a memory task in which six of the twelve stories were presented, one in each of the Actor Knowledge X Outcome versions, and two control stories. Data from this part of the study will be presented elsewhere. A second session was held one to two weeks later and conducted by the same experimenter. For this session each child was told four stories (four that he or she did not see in

session one), one in each condition, as before. Each child head a different story in each of the four conditions, and over all subjects, each story was presented in all four versions.

After each story, the experimenter asked the child a series of questions starting with the general, open-ended question, "When [main character's name] did [crucial act] right here [child is shown picture depicting the act], why did he/she do that?" A semi-structured interviewing technique was used to probe the child's understanding of the actor's goals, motives, knowledge, and beliefs. Table 2 is a presentation of the interview protocol. In addition to asking each of these questions, the interviewer attempted to follow up on any answers the child gave that were not clear or that seemed non-adult-like. This kind of probing was designed to obtain the most sensitive assessment of the children's understanding.

Insert Table 2 about here

After the interview, the children were asked to re-tell the story. The child was then thanked given a small gift (a booklet with another story to be colored), and returned to class.

Results

Coding Reliability

Audiotapes of the interviews were transcribed and independently coded by two research assistants. Answers to the first question, "Why did the actor do the act?", were coded according to whether the child's answer

appealed to the actor's knowledge state, to the actor's motives, or to the goal of the actor's plan. These coding categories are presented in Table 3, with examples and with the percent agreement for the coding decisions. The categories were not mutually exclusive: a single child could have responded "He did it because he knew the diamond ring was in there and he wanted to get it out to give to his mother." This response, of course, uses all three types of explanation. Each child was thus given three scores for each story, indicating whether or not each type of attribution was used. Answers to interview questions 2 through 5 were coded as 'yes' or 'no' with 100% agreement between the two coders.

Insert Table 3 about here

The two coders also made a judgment about the internal consistency of the child's answers over the entire interview. If, for example, a child said that the actor did the act in order to bring about the outcome, but the child also denied that the actor knew about the crucial event that enabled the act to produce the outcome, then the answers were judged inconsistent. These judgments were made with 92.9% agreement.

Data Analysis

Four contrast scores were formed for each of the dependent variables, and were analyzed by one-way analyses of variance, with Grade as the independent variable. The first contrast score was a sum over the four story types. A Grade effect on this variable would indicate a Grade main effect.

The second compared the two positive outcome stories to the two negative outcome stories. The grand mean effect for this variable would indicate on Outcome main effect, and a Grade effect would indicate an Outcome X Grade interaction. The third contrast compared the two actor-knowledge stories to the two no-knowledge stories, and was used to indicate a Knowledge effect and a Knowledge X Grade interaction. The fourth contrast corresponded to the Outcome X Knowledge effect, and compared the PLAN and BAD LUCK stories to the SURPRISE and ANOMALOUS stories. This method of analysis for repeated measures experiments is described in McCall & Appelbaum, 1973. For clarity of presentation, the means for the various story types rather than the contrast scores will be reported here.

Why did the actor do the act?

Kindergarteners were less likely than were second graders to mention the actor's knowledge state in answering this question, $F(1, 21) = 12.69$, $p < .002$. Mean number of knowledge attributions for the four stories was 1.33 for the younger children, and 2.91 for the older children.

Kindergarteners were more likely than were second graders to use goal attributions, $F(1, 24) = 10.08$, $p < .004$.[1] This tendency was qualified by marginally significant Grade X Outcome effect, $F(1, 24) = 3.25$, $p < .092$. Kindergarteners were more likely to make goal attributions in the positive outcome (1.40 out of 2) than in the negative outcome stories (.667 out of 2). Second graders were relatively unlikely to use this type of explanation in either case (.364 and.545 respectively).

Motive attributions were more often given in the positive outcome (1.08 out of 2) than in the negative outcome stories (.620 out of 2), $F(1, 22) = 6.76$, $p < .016$. This finding was qualified by a marginally significant Grade X Outcome X Knowledge interaction $F(1, 22) = 4.16$, $p < .054$. Second graders were most likely to mention motives in the PLAN sequence (knowledge, positive outcome) and were least likely in the ANOMALOUS story (knowledge, negative outcome). Kindergarteners, on the other hand used motive attributions equally for the PLAN and ANOMALOUS stories, but had a strong tendency for appeal to actor's motives in the SURPRISE (no knowledge, positive outcome) story.

Figure 1 displays the means for the three types of attributions for each grade.

Insert Figure 1 about here

Did the actor know about the crucial event?

Children of both grades were more likely to answer 'yes' to this direct question about the actor's knowledge state when the stories showed the actor entering the scene before the crucial event, $F(1,24) = 2.02$, $p < .046$. Actor knowledge was inferred an average of .423 times in the two knowledge stories and .154 times in the no-knowledge stories. The story outcome also influenced children's tendency to infer knowledge, with .423 'yes' responses in the positive, and .154 in the negative stories, $F(1,24) = 5.80$, $p < .024$.

Was the actor trying to make the outcome happen?

A Grade X Outcome interaction revealed that kindergarteners were much more likely to answer that the actor was trying to bring about the outcome

in the positive than in the negative outcome stories (1.53 vs. .200 out of 2), whereas second graders were not as strongly affected by outcome (.727 vs. .091), $F(1,23) = 7.62$, $p < .011$. Overall, kindergartners were significantly more likely to answer that the actor was trying than were second graders, $F(1,23) = 5.85$, $p < .024$, and both were more likely to give this response in positive outcome stories, $F(1,23) = 52.99$, $p < .001$.

Did the actor think the outcome was going to happen?

Both kindergarteners and second graders tended to answer 'yes' to this question more when the story outcome was positive (.923 out of 2) than when it was negative (.154), $F(1,22) = 18.06$, $p < .001$. There was no effect for the actor knowledge manipulation on this variable.

Did the actor want the outcome when he/she did the act?

The outcome was seen as wanted by the actor in the positive outcome stories (1.75 out of 2) and not in the negative outcome stories (.125), $F(1,20) = 97.29$, $p < .001$.

Internal Consistency of Responses

Second graders were more likely than kindergarteners to make their answers internally consistent (3.73 vs. 2.87 out of 4), $F(1,24) = 7.09$, $p < .014$. This effect was qualified by a Grade X Knowledge X Outcome interaction, $F(1,24) = 5.17$, $p < .032$. (See Table 4.) Although second graders rarely gave inconsistent responses, when they did, it only happened in the SURPRISE and ANOMALOUS stories. Kindergarteners, on the other hand, made their fewest

inconsistencies in the ANOMALOUS story sequences, and were equally likely to be inconsistent in the other three stories.

Insert Table 4 about here

Discussion

We began each interview with the general, open-ended question, "Why did the actor do the act?" in order to learn what constructs the children would spontaneously use in explaining the behavior of others. It is interesting to note that all but 7 of 104 responses to this question could be classified as knowledge, goal or motive explanations. The seven cases that could not be so coded were all in the ANOMALOUS story condition, and these children simply answered "I don't know." We did not observe any responses that appealed to the character of the actor, e.g. "She did it because she's a smart girl." Nor did we observe any responses that appealed to rules or authority, e.g. "He did it because his mother told him to." No children gave answers that ignored the planfulness of the act, e.g. "There wasn't anything else to do," and no children made irrelevant or uninterpretable responses. When adults talk to children about behaviors, it is not uncommon for them to appeal to characterological constructs or to authority in explaining or interpreting acts - especially the children's own acts. It is interesting that elementary school children did not come up with these kinds of responses when asked to explain the behavior of characters in simple stories.

There does appear to be a change during the ages studied in the preferred explanation. Second graders explained the act in terms of the actor's knowledge seventy-five percent of the time. Their tendency to do this was not significantly affected by story type. Looking at the specific answers given, we found that virtually all of them appealed to the actor's desire to know, or to "find out" about the act or about the outcome (a curiosity explanation). Even in the PLAN sequence, this was the predominant response among second graders.

Kindergarteners, on the other hand, rarely spoke of the actor's knowledge. They were about equally likely to frame their answers in terms of motives and goals. The use of motives and goal attributions was influenced by story type in a complex way. Kindergarteners used goal attributions more in positive than in negative outcome stories and they used motive attributions more in the actor knowledge than in the no knowledge stories. Second graders used these attributions so infrequently that it seems unwise to interpret differences due to story type.

We have no good explanation for the kindergartener's tendency to differentially use goal and motive explanations according to the outcome and actor knowledge respectively. However, we tentatively propose that they do not spontaneously use knowledge explanations because actor knowledge has not yet become a part of the plan schema for most kindergarteners. We also propose that the second graders' overwhelming tendency to explain the actors behavior in terms of the actor's knowledge may indicate that second graders are only

just beginning to add this construct to their plan schema, and that actor knowledge is therefore particularly salient at this point in their development.

When children were questioned specifically about their understanding of the actor's knowledge, goals and motives, their responses were non-adult-like in puzzling ways. First, both the kindergarten and second graders had a strong tendency to deny actor knowledge regardless of story type. In all of the actor-knowledge stories, the actor entered the scene and looked at an object (for example, a cardboard box). The experimenter explicitly pointed out the line of sight as she showed the child the illustration of this part of the story and said, "Tommy comes around the fence and sees a brown box in the back yard." A critical event then occurred, (for example, a puppy or a skunk crawled into the box), after which the actor performed the act (reaching into the box) which produced the outcome. Despite our effort to clearly show that the actor observed the critical event in this condition, children denied actor knowledge of the event 79% of the time. Their tendency to attribute knowledge to the actor was strongly affected by the outcome manipulation with actor knowledge attributed in 21% of the positive outcome stories, and in only 8% of the negative outcome stories. (The F value for this effect was in fact stronger than that for the Knowledge effect, although the means were the same.)

Children were somewhat more willing to claim that the actor thought that the outcome would happen than they were to claim that the actor knew about the critical enabling event. When the outcome was positive, they

attributed this expectation to the actor 46% of the time (as compared to 8% of the time in the negative outcome story). The timing of the actor's entrance on the scene had no effect on the children's perceptions of the actor's expectations about the outcome.

Children of both ages, but especially kindergarteners, were more likely to answer that the actor was trying to make the outcome happen than they were to answer that the actor knew about the critical event or expected the outcome. Again, the valence of the outcome had an effect here, and had an especially strong effect on the younger children. Kindergarteners said the actor was trying to get the outcome 76% of the time when the outcome was positive. Adult-like responses would lead one to infer that the actor was trying to get the outcome only 50% of the time -- only in the actor knowledge stories. Thus, our kindergarteners were similar to the younger children in Sedlak (1979) in their tendency to over-infer intent.

In 28% of the stories, kindergarteners gave internally inconsistent responses, as compared to 7% for the second graders. The only inconsistent responses made by the older children occurred in the SURPISE and ANOMALOUS stories Kindergarteners were inconsistent in all four story conditions although they were somewhat less inconsistent in the ANOMALOUS condition.

Consider the pattern of results observed for the kindergarten children in terms of the processing model described previously. Few of the children seemed to have difficulty at the motive-schema phase. Most of the time the outcome was held to be the goal of the act for the positive outcome stories; the outcome was virtually never held to be the goal in the negative outcome

stories. Once the goal hypothesis was generated, many of these younger children did not see a need to or were unable to coordinate their answers to the questions about actor knowledge and actor expectations. Nor did their answers to these questions regularly reflect an adult-like reading of the external evidence. Kindergarteners made both the errors of inferring knowledge when the story gave evidence that the actor did not know (the egocentrism error) and the error of denying knowledge when the story gave evidence that the actor observed the critical event, with the latter being the more frequent. It appears that the kindergarteners flounder at both the second and third phases of the plan interpretation process.

Second graders presented a more puzzling pattern of results. First of all, unlike the younger children, second graders did not uniformly accept simple hedonism as a basis for inferring the actor's goal. In the PLAN story, where the actor knowingly produced a good outcome for the self, second graders overwhelmingly claimed that the actor did the act in order to find out what would happen. Having made this claim, second graders recognized the need to make a consistent statement about the actor's knowledge and expectations. In order to be internally consistent, however, they had to ignore or discount the extenral evidence.

Why should the second graders, who have for the most part mastered the ability to coordinate the components of a simple plan schema, refuse to reject a plan hypothesis which the external evidence fails to support, especially when a plausible alternate goal can be inferred from simple hedonism? We believe that the answer to this question lies in the way our

study was presented to the children. For various reasons, we did not tell the children who participated that we were interested in their understanding of plans; we told them we were interested in their understanding of stories. Therefore, they did not bring their plan schema to bear on this task; they called up their story schema. Although our PLAN sequences were very good examples of planned action, they were very bad examples of stories. They lacked dramatic tension; they were boring. Second graders, we believe, made the PLAN sequence into a better story by denying actor knowledge and positing curiosity as a goal.

The results of this study indicate that the recognition of others' plans may be problematic for kindergarteners on two fronts. There is evidence that they have only an incomplete plan schema which allows them to comfortably assume that the goal of an actor's plan was unforeseen by the actor. But even if they did know that actor knowledge is important it appears that they would still err by misinterpreting the external evidence relevant to the inference of knowledge. The pattern of errors observed was not consistent with an egocentrism explanation. Future research will need to explore the kinds of external evidence that kindergarteners can and cannot adequately use for the interpretation of plans.

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Notes

[1]Degrees of freedom vary slightly for the various *F* tests because subjects were eliminated from tests when they responded "I don't know" to the interview question.

Table 1

Four Types of Stories Presented

	Actor Enters before Crucial Event	Actor Enters after Crucial Event
Outcome Positive for Actor	PLAN story	SURPRISE story
Outcome Negative for Actor	ANOMALOUS story	BAD LUCK story

Example Story

ACTOR ENTRANCE:		Jeff comes into his classroom and looks at his lunch.
CRUCIAL EVENT	Positive Version	Jeff's best friend puts a candy bar in Jeff's lunch bag.
		OR
	Negative Version	A mean bully puts a spider in Jeff's lunch bag.
ACT		Jeff puts his hand in lunch bag.
OUTCOME	Positive Version	Jeff gets a delicious candy bar to eat.
		OR
	Negative Version	Jeff gets a sting from the spider.

Table 2

Interview Protocol

[Show the child the picture of the ACT]

(1) Right here, when [actor's name] did [ACT], Why did he/she do that?

(2) Right here, when [ACT] happened, did [actor's name] know about [CRUCIAL EVENT]?

If yes: (a) How did [actor's name] know that?
How did he/she find out?

If no: (b) Why didn't [actor's] name know that?
What kept him/her from finding that out?

(3) When [actor's name] did [ACT], was he/she TRYING to get [OUTCOME]?

(4) Did [actor's name] think that [OUTCOME] was going to happen when he/she did [ACT]?

(5) Did [actor's name] WANT [OUTCOME] when he/she did [ACT]?

Table 3

Examples of Coding Categories and

Reliability of Coding Decisions

Coding Category	Examples	Per Cent Agreement
Why did ACTOR do ACT?		
Knowledge Attributions	To see what it was like. To find out what was in there.	92.9%
Goal Attributions	To get the diamond ring.	92.9%
Motive Attributions	Because he wanted the puppy for a pet.	100%

Table 4

Effect of Grade, Story Outcome and

Actor Knowledge, on the Proportion of Stories

with Internally Consistent Responses

	Actor Knowledge		No Knowledge	
	Positive Outcome PLAN	Negative Outcome ANOMALOUS	Positive Outcome SURPRISE	Negative Outcome BAD LUCK
Kindergarteners				
	.67	.87	.67	.67
2nd Grade				
	1.00	.91	.82	1.00

Figure Caption

Uses of Knowledge, Goal, and Motive Attributions to Explain Actors' Behavior.